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AUTHOR Presseisen, Barbara Z.; And Others
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ABSTRACT

The time has come to seriously consider thinking as a major goal for teaching and learning at all levels of education. This calls for educational restructuring in which higher order cognitive processes are defined, and a better understanding for how to develop them in all youngsters and adults is built. Youngsters need to become constructors of knowledge and not mere recipients of someone else's thinking. The history of teaching thinking has been shaped by three different perspectives: philosophical, psychological, and educational or pedagogical concerns. The development of thinking skills instruction is also rooted in a history of testing in American schools. Major concerns in the interdisciplinary study of thinking include the theoretical foundations of thinking, research on development and learning, and practices in teaching and testing thinking. The works of 12 thinking experts are briefly described. (Contains 34 references.) (JDD)

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TEACHING THINKING: A FOCUS FOR SCHOOLING

A paper prepared for the RBS meeting on restructuring

Barbara Z. Presseisen
with Francine Beyer and Janice Kruse

Research for Better Schools, Inc.
444 North Third Street
Philadelphia, PA 19123

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TEACHING THINKING: A FOCUS FOR SCHOOLING

There is a growing awareness in American education that we must prepare our students to think on their own. In a society facing the twenty-first century, where change may be the only constant, the ability to formulate problems, resolve issues, determine the most effective decisions, and create new solutions is a prerequisite of success -- for life as well as for schooling. The time has come to seriously consider thinking as a major goal for teaching and learning at all levels of education (Berryman, 1989; Cohen, 1988; Resnick, 1987). This paper presents an overview of teaching thinking in the context of the current reform movement. It consists of four discussion sections and a summary. The discussion topics are: Teaching Thinking - A New Idea? A Historical Perspective, Overview of Research on Thinking, and Approaches to Teaching Thinking.

Teaching Thinking - A New Idea?

Teachers often say they are already teaching thinking. In language arts, mathematics, social studies, and science, it seems obvious that the ability to think is necessary for student achievement. In some American classrooms, teachers devoted to their school subjects do instruct students on how to become more skilled in that area. Other classrooms, however, may not be so fortunate, and teachers in them instruct students without concern for content development and largely unaware of cognition or what Gardner (1985) calls "the mind's new science." The current movement to restructure schooling raises the age-old controversy of content vs. process, and, in an era highly influenced by the proliferation of information, really poses the question of how to manage **both** content and process (Presseisen, 1988b). At heart is the need to define the higher order cognitive processes and to

build a better understanding for how to develop them in all youngsters and adults. A key thesis of this approach is to help youngsters become constructors of knowledge and not mere recipients of someone else's thinking.

Increasingly, research suggests that developing higher order thinking skills requires more than mere coverage of content (Newmann, Onosko & Stevenson, 1988; Sizer, 1984). What is meant by thinking? What processes does it involve and what strategies enhance its development? What have we learned from the half dozen years of experience we have had emphasizing the teaching of thinking -- critically, creatively, and relative to problem solving and decisionmaking -- that can inform classroom teachers and better prepare teachers in the future? These questions are now being addressed in the current reform period. They represent a new understanding about teaching and learning and they are a rich source of discussion for teachers and administrators who must carry out the development and implementation of new programs for schooling. They are the bases for developing a powerful and purposeful new focus for schooling in the United States.

A Historical Perspective

The current period is not the first time cognitive aspects of learning have been emphasized in the classroom. In the 1960s, American education was influenced by the work of Jerome Bruner and other cognitive researchers (Bruner, 1960; Penfield, 1959). At about the same time, Robert Ennis (1962) advocated the teaching of critical thinking and stressed the importance of dispositions for questioning and skepticism as the bases of reasoned judgment. New curricular programs in science, history, and mathematics were developed during this period. Although they emphasized the importance of content structure and academic instruction, these new programs underplayed

the importance of the development of cognitive operations and the influence of the classroom teacher.

The curriculum packages of the 1960s were "teacher proof," purposely delivered directly to the classroom by publishers, untouched by anyone but university "experts." Many current researchers (e.g., Lazerson, McLaughlin & McPherson, 1984) consider this an error of the earlier reform period. They stress, rather, the importance of the role of teachers in the planning and development of instruction, the selection of appropriate instructional materials, and in the tailoring of the class' or student's explicit thinking program.

A review of the history of teaching thinking reveals three different perspectives that have shaped school practices: philosophical, psychological, and educational or pedagogical concerns (Sternberg, 1985). Philosophers have long dealt with the problem of knowledge and modes of inquiry. Nineteenth century thought addressed issues of empiricism and scientific research. But researchers tend to communicate only with other writers in their own field or perspective. Sometimes their ideas influence the classroom instructor, as information on testing and intelligence is drawn from psychological literature. All too frequently, however, the teacher does not have the opportunity to examine the ideas that come from all three of these scholarly perspectives. In this new period of emphasis on cognitive development, such examination is critical. The teacher who must develop and manage the student's thinking program needs to be familiar not only with research concepts, but with the assumptions underlying them and the goals embedded in the thrust for better cognitive performance. "Teaching is a cognitive activity," says the good teaching literature (Harvard Education Letter, 1989), and teachers need opportunities to discuss

such issues and to plan cooperatively with their instructional colleagues (Brandt, 1989).

The development of thinking skills instruction is also rooted in a history of testing in American schools. Much of the impetus behind the current reform movement in education stems from concern over declining test scores. Whether the focus is on the Scholastic Aptitude Test (SAT), the National Assessment of Educational Progress (NAEP), or a recent international study, the message to the nation in many of the recent reform reports is that in mathematics, science, and reading comprehension American youngsters are outperformed by their counterparts around the world (Presseisen, 1985). Particularly in the performance of higher order reasoning skills, it is claimed that American youngsters -- and their teachers -- may not be competitive with the students and teachers of other industrialized societies (Carnegie Task Force, 1986; Fiske, 1989; Reich, 1989). Teaching thinking explicitly and intentionally is offered as a major strategy to remedy this situation. Relating thinking to the whole curriculum and to the many instructional processes of the classroom is presented as a potential way of redirecting education for all youngsters, those at the top of the learning curve as well as those at risk of dropping out of the school population (Jones, 1986; Presseisen, 1988a).

Before such a movement to develop student's thinking ability can influence pedagogy, it has become evident that teachers need to explore the extensive research underlying the many dimensions of thinking (Marzano et al., 1988). Concepts like metacognition and self-regulated learning are new and important issues for dealing with aspects that influence the performance of learners in a classroom. Cooperative learning, reciprocal teaching, and developmentally appropriate instruction are particular strategies that have

emerged from the so-called cognitive revolution, but they are as foreign to the perspectives of many of America's teachers as the names of Jean Piaget, Reuven Feuerstein, and Lev Semenovich Vygotsky. In the global economy of a complex world, American education can ill afford such ignorance.

Overview of Research on Thinking

One of the difficulties of examining the research on thinking is the vastness of the related literature. There are major fields of concern in the interdisciplinary study of the new cognitive science. For educators, three particular fields seem to be significant foci to address:

- The Theoretical Foundations of Thinking
- Research on Development and Learning
- Practices in Teaching and Testing Thinking.

Theoretical foundations of thinking looks at questions such as: What are the various kinds of thinking? How is thinking related to conceptions of intelligence? How can thinking be embedded in a program that will help the learner improve his/her actual cognitive processes? Although researchers are not unanimous on any single definition of thinking, there is general agreement among many scholars that there are various kinds of thinking (Cohen, 1971). From the philosophical perspective, Lipman (1985) maintains that thinking involves reasoning in a number of ways, understanding certain kinds of relationships, and detecting particular problems or ambiguities. From the psychological perspective, Nickerson (1981) stresses not only some basic abilities that constitute thinking, such as reasoning and discovering relationships, but the methods and attitudes that make thinking effective. He further suggests that thinking is expressed in different modes, such as

verbal or spatial depictions, as well as in higher order operations such as problem solving, decisionmaking, and inventive or creative thinking.

Cognitive developmental research over the past half century has influenced our understanding of the various kinds of thinking and ways they are promoted or taught. Piaget's (1970) early studies of how children develop intellectually raise questions about how mental processes are formulated and evolved. Research based on the works of Vygotsky (1962) and Feuerstein (1980) has begun to be prominent in educational literature and influential in the planning of educational practice, especially when considering the social interaction important to the construction of new ideas or to the acquisition of complex operations. Studies of aesthetics and giftedness suggest theories of "multiple intelligences," and introduce questions about both novice and expert performance (Gardner, 1983; Resnick, 1987).

The movement to teach thinking has become important to characterizing classroom practice, as well as to advocating the development of cognitive skill. Strategies for classroom instruction, whether embedded in specific training programs or emphasized in commercially available materials, have become as significant as lists of core skills and basic processes have been in the past. Cooperative teaching techniques, group as well as individual instruction, problem solving by team involvement, and heavy doses of reflection are elements of new critical reading programs, enactive science lessons, and in-depth historical simulations, as teaching thinking is wedded to the classic teaching of content (IRT Communication Quarterly, 1989). Even the use of computers in learning is viewed both from the point of reference of what kind of learning ought to take place and how can thinking

processes be enhanced and acted upon as the students use a particular software program (Brown, 1988; Pogrow, 1989).

Finally, the testing and assessment of thinking programs is a lively topic of research. Potential new ways of dynamically evaluating student performance is the focus of one innovative approach to student diagnosis and treatment (Lidz, 1987). At the same time, new ways of measuring achievement and intelligence are under way (Sternberg, 1989). Other researchers are examining whether thinking programs have actually accomplished their goals and whether such programs have been effective in changing the targeted populations they sought to influence (Adams, 1989; Newmann et al., 1988; Nickerson, 1988). It is obvious that all the answers on teaching thinking are by no means clear and self-evident. It is also obvious that a rich treasure trove is in the process of being explored. Whether a school seeks to develop its own thinking program, or a district its particular approach, or a state its specific model, teaching thinking is a provocative idea whose time has come.

Approaches to Teaching Thinking

The literature on teaching thinking includes the works of a number of well-known researchers or developers whose approach or program is nationally or internationally known. It helps educators to know who these leaders of teaching thinking are, if only to sort out the myriad of detail about available materials. The following catalogue of thinking specialists is not expected to be comprehensive or exhaustive, but merely to serve as an introductory aid to the educator seeking clarity of information about various thinking "experts":

BARRY BEYER - A university professor who has written several major volumes on developing and implementing programs for teaching thinking, as well as specific strategies for teaching thinking in the area of elementary and secondary history and social studies. Beyer has experience in conducting staff development and training sessions for a number of school districts across the country, and he serves as consultant and/or editor on several boards or task forces.

EDWARD DE BONO - An English scholar who defines thinking as "the operating skill with which intelligence acts upon experience" (1983, p. 703). He maintains that such skill can be taught directly and that certain aspects, such as lateral and creative thinking, are more valuable to the thinker than other aspects. de Bono emphasizes the particular importance of changing one's perceptual base when thinking and he has developed two major programs, CoRT and MasterThinker II- Six Thinking Hats, to teach youngsters and adults how to do so. de Bono travels the world training educators, private sector leaders, and governments in his approach.

ROBERT ENNIS - A proponent of critical thinking as the major emphasis of learning to think. Ennis defines critical thinking as the reasonable reflection one performs when deciding what to believe or do. Such thinking involves both dispositions and abilities such as inference, induction, deduction, and problem solving. In his viewpoint, much depends on the thinker's interaction with other people in his or her environment. He also stresses the importance of clarity of information to inform the thinker's decisions. Ennis is the author of a number of well-known testing instruments used in evaluating student and adult thinking ability.

REUVEN FEUERSTEIN - Well-known Israeli psychologist who was originally concerned about the thinking ability of retarded adolescents. His more generalized research on structural cognitive modifiability suggests thinking patterns can be changed with appropriate intervention at any time in life and for any population. Based on extensive field applications, Feuerstein has developed a program, Instrumental Enrichment, in which learning activities have been designed to help students adapt to new situations and to develop different perceptions of what needs to be done to succeed in these situations. The teacher's role as a mediating influence is the key to success in his instructional approach. Both a group and and an individual testing instrument has been developed by Feuerstein and his associates on the principles of a "dynamic assessment."

HOWARD GARDNER (AND DAVID FELDMAN) - Both proponents of a theory of "multiple intelligences," and the need to examine the varied and complex ways of knowing characteristics of children. Gardner oversees a number of projects implementing his theory such as Project Propel, a fine arts program in Pittsburgh, and the Key School curriculum and teacher development project in Indianapolis. He also serves on Project Zero, a research study at Harvard. With Feldman, Gardner also works on Project Spectrum, a pre-school study developing a model for instructing young learners so as to enhance all their thinking ability. Their research involves both youngsters from affluent backgrounds and from urban settings.

MATTHEW LIPMAN - Stresses the importance of philosophy and reasoning with language as the basis of developing children's thinking ability. Very similar to the critical thinking approach, in his Philosophy for Children program Lipman has developed classroom materials and a teacher education program for early childhood through secondary school instruction. Translated into a number of languages, the program is taught throughout the world. Lipman's Center is at Montclair State University in northern New Jersey.

RICHARD PAUL - Directs the Center for Critical Thinking and Moral Critique at Sonoma State University in Rohnert Park, CA. The Center conducts advanced research and disseminates information on critical thinking and applications of such thinking in the school's curricula. It also hosts a large, national meeting each summer featuring speakers on the theory and practice of teaching critical thinking. K-12 education, as well as university level applications, are targets of the Center's work.

DAVID PERKINS - Emphasizes creative thinking in much of his research. Also a member of Project Zero's staff at Harvard, Perkins is concerned with the aesthetics of product development in teaching thinking, as well as with the enhancement of originality of thought. Perkins has explored various "frames of thinking," as well as worked on "connections" between content and processing information (in collaboration with the Northeast Lab). The use of computers in thinking and transfer of learning are two topics Perkins has researched extensively. He also leads the group that has organized the International Conference on Thinking held every other year at various places around the world. This August the meeting will be in San Juan, PR.

LAUREN RESNICK - Examines in particular the conditions of both the novice and the expert learner. Associated with the Learning Research and Development Center at the University of Pittsburgh, Resnick has investigated extensively mathematical learning and the development of sound curriculum and instructional strategies for student achievement. She is the author of a major study, Education and Learning to Think, (1987) and is serving as the Editor of ASCD's 1989 Yearbook on Cognitive Development.

ROBERT STERNBERG - Presents his triarchic theory of intelligence which emphasizes thinking and learning skills drawn from an information processing approach. Sternberg specifies particular mental mechanisms that lead to intelligent behavior and that include learning how to do things, planning what things to do and in what sequence, and the strategic performance of tasks. He is keenly interested in intuitive and analogic reasoning, and he is active in the revision of major testing instruments. Sternberg is the IBM Professor of Psychology and Education at Yale University.

ARTHUR WHIMBEY - Emphasizes a holistic orientation to learning to improve one's thinking. He stresses complete and precise processing, and the combination of various reasoning skills into extended, sequential, and multiple-step applications of thinking focused on a particular problem. Whimbey also is interested in students' own explanations of their thinking and ways teachers can question and probe students for greater learning in the classroom. He is a strong advocate of the idea that thinking can be taught and he travels widely serving as a trainer for school personnel.

S. LEE WINOCUR - Has developed a critical thinking program, Project Impact, which addresses not only the skills of thinking but also the teacher development concerns and faculty orientation needs for teaching thinking. The program also develops a model for including specific school subject contents in the instruction. Various training workshops on Project Impact are offered across the country and throughout the school year. Winocur is located at the Center for Teaching Thinking associated with the Huntington Beach Union High School District in California.

There are many other efforts to teach thinking or to help educators understand the teaching of thinking that one could mention in such a review. The work of various organizations like the Association of Supervision of Curriculum Development, the National Education Association, the American Federation of Labor, the Association of American Colleges of Teacher Education, the National Council of the Teachers of English, the National Council of the Teachers of Mathematics, and the International Reading Association could all be cited. Similarly, efforts at a number of colleges and universities, such as the University of Massachusetts, Michigan State University, Stanford University, and the University of California at Berkeley could well be described. The collaboration of the nine regional laboratories funded by the Department of Education has included a project emphasizing the teaching of higher order thinking processes and sharing information on activities in their several regions, as well as related work at the Centers funded by the Department of Education.

Summary

A great many efforts have been launched in the past several years that advocate the teaching of thinking as their central raison d'être. Each has its own particular perspective on what thinking is and how best to teach it. All of these efforts warrant a close watch and much discussion on their similarities and differences, as well as their successes, failures, and findings from implementation. Perhaps, with such intellectual activity, answers can be sought on the important questions that underlie this educational thrust. This is the stuff of educational reform periods. That the momentum exists to inspire such activity suggests that light as well as heat may be the outcome of the experience.

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